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ABSTRACT

Energy conservation in school transportation is a major area of concern to the educational community. School buses travel in excess of four billion miles annually consuming 900 million gallons of fuel, transporting 55 percent of the school enrollment (grades K-12). Since the fuel allocation emergency, school transportation managers have begun efforts to reduce the amount of fuel required to transport pupils to and from classroom sessions and school-related activities. The guidelines and suggestions in this pamphlet are intended to assist the school transportation administrator to achieve better fuel and cost management goals in meeting transportation demands. (Author/MLF)

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ENERGY CONSERVATION MATERIALS PACKAGE

4 How to Conserve Energy in School Transportation Systems

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HOW TO CONSERVE ENERGY IN SCHOOL TRANSPORTATION SYSTEMS

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HOW TO CONSERVE ENERGY IN SCHOOL TRANSPORTATION SYSTEMS

Introduction

Energy conservation in school transportation is a major area of concern to the educational community. School buses travel in excess of four billion miles annually consuming 900 million gallons of fuel, transporting 55% of the school enrollment (grades K-12).

Since the fuel allocation emergency, school transportation managers have begun efforts to reduce the amount of fuel required to transport pupils to and from classroom sessions and school-related activites.

The impending crisis of rapidly escalating fuel prices and limited school budgets are now at hand with no assurance that yet another oil embargo will not be initiated.

The enclosed guidelines and suggestions will assist the school transportation administrator to achieve better fuel and cost management goals in meeting his transportation demands.

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GENERAL ENERGY PRACTICES

1. Have one person in charge of all energy for transportation.

   Designate one person to be the Energy Coordinator for the school district. This person will:

   --be in touch with local, state, and federal energy offices.

   --keep all forms such as FEA forms on hand and know where, how, and when to file them, and to follow up on them.

   --keep the various departments informed of the energy situation at all times, i.e., cut back in heating fuels, bus fuels, etc. or rationing.

2. Conduct an Energy Audit--begin at all places where fuel is used.

   a. The Audit should be a month-by-month use for three years with estimates for the current year. Included should be prices, suppliers, bulk storage data, delivery dates and practices.

   b. Information should be accurate and specific, not general.

   c. Analyze fuel supply availability and current needs. Which months require the most gasoline or diesel? Which months require the least gasoline?

   d. Set up action plans.

   e. Set up contingencies for time when fuel is in short supply.

   f. Monitor programs as devised to see if they are being effectively carried out.

Remember the school which systematically identifies and evaluates its needs and supplies, highs and lows, can tailor programs more effectively in advance--rather than be caught short.

OTHER CONSIDERATIONS

1. The people are very well informed by the media on the need and method of conservation and expect the schools to exert a leadership role.

2. There should not be major operational differences between school districts within the city or local areas. Communicate with surrounding school leaders and share program ideas.

DRIVER EDUCATION PROGRAM

1. Automobile manufacturers should be encouraged to adjust their free loan program to permit greater use of intermediate and smaller-size cars. Schools should be encouraged to use intermediate and smaller cars when available.

2. Driving simulation should be utilized whenever feasible to reduce on-street behind-the-wheel driving time.

3. Where practical, cars should be stored centrally, not taken home by instructors.

4. Driver education vehicles shall be used only for driver education lab instruction.

5. Vehicles should be equipped with steel-belted radial tires properly inflated to reduce gasoline consumption.

6. Students should be pre-tested and given credit for previous training and experience.

7. Driver education instructors should seek new techniques and materials that combine gasoline conservation and safe and efficient driving.

OPERATION OF SCHOOL VEHICLES OTHER THAN SCHOOL BUSES

1. Develop an information exchange of ideas on fuel conservation between districts and with industry. Coordinate transportation with other public agencies.

2. Coordinate and consolidate pick-ups, deliveries, and messenger service between schools through the central office.

3. Make warehouse deliveries to schools on a very minimal basis.

4. Encourage all employees to ask themselves the following questions before undertaking a trip: Can someone else do it who is going that way? Can I deliver something for someone else? Can I do it on the way home?

5. Adopt policy for all trips by employees to meetings, conferences, conventions, etc. Limit amount of mileage allowance.

6. Utilize conference telephones as substitutes for small meetings.

7. Use telephone calls instead of home calls where feasible.

8. Install two-way radios to direct operation or redirect district vehicles to reduce mileage.

9. Request that all district employees form car pools when traveling on official business.

10. Coordinate conferences out of district for sharing rides. Use a central location as place of embarkation.

11. Have district personnel, who service a number of schools, coordinate trips to include as many stops as possible and include other district personnel serving the same schools.

12. Utilize a vehicle coordinator to avoid duplicate trips to various schools for maintenance and delivery service.

13. Coordinate supply logistics for all departments so as to keep deliveries at a minimum with a maximum load per trip.

14. Communicate with all related organizations, i.e., PTA, Board of Education, to share ideas ... and car pools.

15. Make one office staff person available to help formulate car pools for office staff, janitors, cooks, and teachers.

16. Issue school parking places with priority granted to car pool riders for staff personnel and students.

Preventative Maintenance:

1. Tune and maintain engines, plugs, points, and timing. Maintain and clean pollution controls.

2. Keep gas tanks full to avoid excessive evaporation. Avoid spillage by allowing for expansion in warm weather or parking on an incline.

3. Ensure that bus tires are properly inflated. Soft tires increase gas consumption. Inflate to maximum safe level.

4. Replace buses that use excessive amounts of gasoline as soon as economically feasible.

5. Keep gasoline tanks locked with one person in charge of fueling buses and other school vehicles.

6. Keep accurate bus records for maintenance and fuel consumption, oil changes, lubrication, etc. Analyze record data for potential management decisions to achieve savings.

7. Inventory all parts and supplies and order for a full school year on a planned need basis, with best price, based upon past experience.

8. In winter climatic areas, keep all buses under cover rather than allowing drivers to take home and park. Use engine warmers for easier, fuel-saving starts.

9. Maintain clean oil and air filters.

10. Keep automatic choke clean (additives). A sticking choke will waste gas.

11. Keep air-fuel mixture of carburetor precisely adjusted.

12. Regular oil change with engine tune up. Be sure to use manufacturer's recommended weight of oil. A heavier oil will force engine to use more fuel; too light will not provide protection.

13. Check tire balance and wheel alignment to avoid "drag" which will use more fuel and shorten tire life. Also check frame especially following an accident.

14. Check radiator thermostat. A defective thermostat may prolong engine warm-up, increasing fuel consumption.

15. Be sure to use proper octane-rated fuel for your buses. Using wrong octane will result in plug foul-up and reduction of mileage. Using a higher octane than required is a waste of money.

16. Use engine analyzing equipment to assure maximum efficiency.

17. Make full utilization of service manuals and maintenance bulletins to keep updated on techniques. Take full advantage of free maintenance training clinics conducted at factory branches by skilled instructors.

The Driver's Role in Energy Conservation:

1. Retain experienced drivers as long as possible.

2. Re-educate bus drivers toward better fuel economy.

3. Reduce warm-up time on buses to 2 minutes initially and 3 minutes prior to starting routes. Drivers should dress warmer rather than running engines at full idle to heat buses.

4. Drive slowly and carefully the first few miles until vehicle warms up.

5. Avoid full throttle operation.

6. Avoid the "red line" even in shifting gears.

7. Reduce speed limit to as low as practical.

8. Avoid courtesy stops.

9. Train new drivers on existing runs while bus is "deadheading."

10. Use simulators to reduce behind-the-wheel training in vehicles.

11. Conduct meaningful driver inservice training programs.

12. Train drivers to use pre-planned starts and stops for less gas consumption.

13. Provide workshops involving maintenance and driver personnel to improve communications and understanding.

14. Use a salary incentive system for reducing vehicle fuel consumption.

15. Review driver times and routes. Determine most efficient vehicle utilization, layover, and storage plan to minimize miles for school as well as personal vehicles.

SCHOOL BUS ROUTING AND SCHEDULING

1. When replacing buses or expanding fleet, purchase buses with capacities to provide a balanced fleet. Smaller vehicles are more economic fuel-wise. A balanced fleet will provide capability of maximum vehicle utilization.

2. Utilize proven updating routing techniques either by hand or computer to maintain maximum vehicle utilization at all times.

   a) Evaluate current transportation system.

   b) Revised system should strive to reduce mileage, number of stops, student riding time, and distance.

   c) School board policy on building organization should be reviewed and revised to reduce dependency upon transportation.

3. Consolidate inter-district transportation systems when possible to meet special transportation demands which dictate crossing school district boundaries, i.e., vocational education and handicapped transportation programs.

<u>School Bus Operation--General</u>:

1. Lengthen distances between pick-up points, where safe.

2. Plan stops on level instead of on inclines.

3. Consolidate loads.

4. Plan routes to make only righthand turns to save on idling time where safety in routing permits.

5. Use intercoms on buses to reduce stops for controlling discipline.

6. Reduce weight by removing luggage racks, extra tire, chains, etc. (during warm weather).

7. Install two-way radios to direct operation or redirection of buses to avoid unnecessary use.

8. Install trip recorders to record and monitor driver and vehicle operation when necessary.

9. Use the smallest available vehicle for long-distance, light-load runs.

10. Where possible, schedule bus routes to avoid driving up hills; stay on main roads only.

11. Let school staff members ride school buses whenever feasible.

Transportation Policy:

1. Coordinate school calendars and start and dismissal times between elementary and secondary schools of each school system.

2. Eliminate staggered dismissal times in the same buildings.

3. Increase requirements for walking distances to school and to bus stops.

4. Establish pick-up and dismissal schedules at schools to support maximum vehicle utilization.

5. Eliminate buses for detention students.

6. Limit student parking, encourage high school pupils to ride school buses, form car pools, etc.

7. Develop innovations and creative programs to encourage students and staff to walk to school or ride bikes. Furnish adequate bike racks. Provide adequate safety for bikes from theft and vandalism.

8. Combine deliveries with bus routes. Use buses for deliveries where and when feasible.

9. Use school buses for public service, youth transportation, elderly, etc. in off hours.

10. Utilize public mass transit where feasible to avoid duplication of service.

Activity and Field Trips:

1. Reduce or eliminate all but the most necessary athletic contests.

2. Reduce or eliminate all but the most necessary co-curricular trips.

3. Combine co-curricular and athletic tripr for more than one school.

4. Have districts share buses when feasible.

5. Establish minimum and maximum distances for all non-routine trips.

6. Limit field trips to full bus loads only.

7. Combine athletic schedules so several games can be played at the same time.

8. Encourage parents to pool with other parents in transporting children to school for late activities and for extra-curricular events.

9. Contract with parents to provide transportation.

10. Utilize public transportation on the return trip where feasible rather than return by school buses to school or homes.

VEHICLE SPECIFICATIONS WHICH INCREASE FUEL EFFICIENCY

1. Diesel power vs. gasoline (twice the mileage).
2. Smaller capacity buses where practical.
3. Automatic transmission (5-7% increase in mileage).
4. Rubber suspension systems (5-7% increase in mileage).
5. Radial tires; tire balancers.
6. Solid state ignition.
7. Fuel injection (metered fuel).
8. Lower rear-end ratios on new buses.

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